



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/608,521	06/26/2003	Robert J. Rafac	2003-0059-01	8728
7590 10/25/2007 William C. Cray c/o Cymer, Inc. Legal Dept. 17075 Thornmint Court San Diego, CA 92127			EXAMINER PADGETT, MARIANNE L	
			ART UNIT 1792	PAPER NUMBER
			MAIL DATE 10/25/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/608,521

Applicant(s)

RAFAC ET AL.

Examiner

Marianne L. Padgett

Art Unit

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 August 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Art Unit: 1792

1. Applicant amendments to the specification have corrected some problems as set forth in sections 4 & 5 of the action mailed 10/25/2006, specifically in properly writing out the meaning of DUV & providing a definition thereof as supported by the prior art patent to Adams et al. (6,410,209), as cited on page 6 of the 8/8/2007 response (first page of Remarks), as well as clarifying meaning of various abbreviations which clarify meanings & units employed, however not all problems have been corrected, & new issues have been introduced. It is noted that with respect to the amendment on page 8 of the specification, no support for HR = highly reflective; LD = low density & HD = high density was provided, and this paragraph references figures 15 & 16, which do not exist, hence cannot provide support for these additions, although it is noted that the paragraph starting on line 24 of page 8, has overlapping abbreviation/acronyms with descriptive "highly reflective", which may relate to the HR, plus figures 2-5 discuss either low or high density dielectric materials of unspecified composition, where it is further noted that low & high density are relative terms with no necessary range or meaning, unless clearly defined, but indicate the use of this terminology in the specification, if not necessarily associated with the acronyms on page 8.

Amendments to the claims have removed objections & 112, second rejections to the claims, as set forth in sections 1 & 3 of the action mailed 10/25/2006. Applicants have also amended the independent claim to specify that the exposing of the generic multilayered dielectric reflectivity coating is via laser radiation ≤ 300 nm wavelength that induces compaction or densification by removal of water vapor that is associated in some unspecified way with the generic dielectric materials of the coating. The examiner notes that support for this removal of water may be partially found on page 8, line 24-page 9, line 19, which discusses rapid water desorption from "low-density ARO OPuS high reflectivity mirrors", with further reference to "such mirrors", where it is discussed that the UV light removes water from the thin dielectric films on these mirrors, and that after the OH⁻ is removed from this film material the basic structure remains, thus providing support for this claimed techniques of laser removal of water from low-

Art Unit: 1792

density ARO OPuS high reflectivity mirrors, but since the examiner does not know what dielectric materials are used in these mirrors, nor did the applicant design to inform the examiner, exactly what scope of materials this water desorption techniques is applicable to cannot be determined by the examiner from this specification.

2. The disclosure is objected to because of the following informalities: further proofreading is needed, since as noted above page 8, line 13, refers to figures 15 & 16 that do not exist in the original specification.

Appropriate correction is required.

3. Claims 1-7 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Applicants have amended the independent claim 1 to define the purpose of the multilayered dielectric activity coating to be "for reflecting electromagnetic radiation...", however the examiner found no citation of support provided by applicants for this amendment in the specification, nor on searching the PG pub for electromagnetic radiation did the examiner find that this generic term was mentioned anywhere in the original specification, hence this amendment appears to encompass New Matter. While cited exemplary page 4, lines 5-26, discuss reflectivity at 193 nm, and the figures 1-6 of the original specification provides spectrum of the reflectivity in wavelength ranges of 190-250 nm or 190-220 nm, the examiner found no general disclosure in the original specification of dielectric or reflectivity coatings that encompasses any other ranges of the electromagnetic spectrum, as now claimed, and which includes radio waves, infrared, visible, ultraviolet, x-rays & gamma rays (see Webster's dictionary definition), hence this amendment clearly includes New Matter as written.

Art Unit: 1792

The amendment to the independent claim also contains New Matter with respect to removal of water from dielectric materials other than those disclosed in the specification, but as noted above what materials are disclosed therein is unknown due to their identification only via Tradenames, thus it appears that the claim limitations directed to generic multilayered dielectric reflectivity coatings encompasses New Matter, in that not all such dielectric reflectivity coatings are disclosed to be effectively treated as claimed, however what scope is covered cannot be determined by the examiner due to the lack of any indication of what materials are employed, other than identification by tradenames or the like.

The amendment filed 8/8/2007 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: due to the lack of discussion found by the examiner concerning support for the amendment on page 8 & in combination with that paragraph's reference to figures that do not exist, the support for LD & HD necessarily being high and low density is uncertain, such that it would be desirable for applicants to clarify the record (and possibly the paragraph).

Applicant is required to cancel the new matter in the reply to this Office Action.

4. Claims 1-7 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The claims may **still** be considered nonenabled in that no disclosure was found in the specification as to **what actual materials** may be employed for the "multi-layered dielectric reflectivity coating", thus are not enabling to one of ordinary skill in the art to determine what materials may be employed with the claimed treatment to produce the claimed effect. The examiner notes that applicants do refer to various mirrors, which were treated, such as "ARO OPuS high reflectivity mirrors", said to

Art Unit: 1792

have a fused silica **substrate** (page 4), or "and ARO high density film on a **calcium fluoride... substrate...** part number 119679, and Corning samples with different film formations..." (page 5), but **none** of these references to Tradenames, companies or part numbers, etc., provides any teachings to **what materials** are actually being treated in the claimed process, nor are the undisclosed materials used in tradenamed products, etc., necessarily immutable, hence any attempt to amend the specification for what coatings were employed on the named mirrors, etc., must be supported by appropriate **prior art** showings of what those Tradenames, etc., encompassed. Basically, the specification is silent with respect to what materials are ever actually treated by the process, making it virtually impossible for the examiner to perform a full & meaningful search, as she does not know what materials are or might be being irradiated. Furthermore, to elaborate, the examiner finds no indicated usefulness of all possible dielectric materials under existence that may be employed for some reflective purposes, either for virtually any portion of the electromagnetic spectrum as now claimed, or for the specific ranges of wavelengths actually discussed in the specification, or that all such dielectric materials are affected in the same way by DUV laser irradiation as now claimed, so as to induce removal of water vapor causing compaction or densification of the dielectric. For instance, polymeric materials can be both dielectric & have reflective properties, as well as multilayers, so are applicants intending to claim about 2 billion DUV laser pulses onto such materials? Note that supplying the product data sheets or the like on the exemplary multilayered reflective materials tested in the specification, generally provides at least the basic information on type of material of which the products described by the Tradenames or the like, are made, so as to provide enablement for inserting via amendment information concerning Tradenames, etc.

It was previously noted that what material, i.e. what dielectrics are being treated & how it was formed, is very important to whether or not there are potential problems with respect to compaction or densification during use with DUV. For example JP 4-228560 to Takashi et al. teaches a dielectric multilayer film with the appropriate resistance to be used in environments exposed to high temperatures,

Art Unit: 1792

such as optical parts for a higher output and high repetition laser of UV rays, where the technique produces a product where the optical and physical constants, such as refractive index and density, are stabilized, and the film may be used as a reflection increasing film (abstract), with figures showing multilayer oxides, such as alternating alumina and silica, and with col. 5-6 of the Japanese patent appearing to indicate use of wavelengths of 248 nm or from a KrF radiation source (i.e. DUV).

Alternately, Ruffner (5,911,858), in its background (col. 4, lines 29-67), indicates that while some materials, such as silicon dioxide used in lenses absorb small amounts of radiation at 193 nm, such that the radiation is converted heat causing recrystallization so that the lens undergoes optical compaction, other dielectric materials, such as CaF_2 is less susceptible to absorption problems at 193 nm, but have other problems such as stress induced birefringence, thus again showing the importance of identifying materials employed for the claimed exposure technique to be meaningful with respect to densification, as well as showing that there is no support for nor reason to expect, all dielectric materials or all multi-layered dielectric materials or all multi-layered dielectric "reflectivity" coatings to be affected in a like manner by any particular wavelength of DUV or by all wavelengths of DUV.

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly

Art Unit: 1792

owned at the time any inventions covered therein were made absent any evidence to the contrary.

Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claim 1 is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Ruffner (5,911,858).

With respect to claim 1 as amended, it is noted that the "exposing..." step, as written, will still read on mere use of a multilayered dielectric "reflectivity" coating (capable of minimal or major densification) during the normal course of its lifetime, if permanent compaction or densification occurs at any time during which exposure to DUV laser irradiation (where materials undergoing compaction have water removed), noting that when no more densification is possible, i.e. it's fully densified (whether or not it has had detrimental effects on the coated substrate with respect to its intended use), the claim process is complete. The claims as written to not require this stabilization to occur before the substrate with multilayer dielectric reflectivity coating is put into use, such as in the photolithography systems described in Ruffner. In col. 4, lines 29- 54, Ruffner is discussing photolithography systems that operate at DUV wavelengths & they employ SiO₂, which during use undergoes recrystallization, which affects optical compaction that changes the lens system in a permanent manner. Why the recrystallization effects compaction is not discussed, however for compaction to be occurring, something must be being rearranged or removed, such as removal of common impurities, such as -OH &/or removal of voids. In other words, this discussion does not indicate whether or not any water vapor is removed during recrystallization of the SiO₂ material, however dependent on formation means, SiO₂ is old well-known to have hydrogen impurities so as to form -OH or hygroscopic structures, which would have been inherently removed by such recrystallization mechanisms. However, this section continues on to indicate that single

Art Unit: 1792

material systems become impractical at shorter wavelengths, teaching that multilayered mirrors are the only viable alternative (col. 5, lines 1-24 & col. 6, lines 1-20), with col. 6, lines 23-65 describing the general multilayer deposition techniques to create the multilayered mirror & its use in photolithography systems, such as it with 193 nm radiation. Col. 9, lines 42-45 indicate that the DUV radiation source may be lasers, such as ArF or KrF lasers, i.e. 193 & 248 nm lasers. Table I, in column 13 indicates useful pairs of films for multilayer mirrors at specific wavelengths, including three for 193 nm that employ dielectric materials, where the first pair is employing Al_2O_3 & SiO_2 , hence when used is inclusive of materials which are known to have compaction effects, thus would have been reasonably expected to have been inherently affected by permanent compaction during use of a 193 nm laser impinging directly on the surface. What one doesn't know is whether or not the deposition techniques for creating the silicon dioxide layer was one that would have produced hydrogen doping or contaminants, which would have been removed as water during use effecting compaction as mentioned in column 4, however since it is easier to achieve SiO_2 layer deposition with rather than without hydrogen present in the deposit, hydrogen that may be removed as water would have been expected to have been present in some amount in many if not all of such multilayer mirrors, thus encompassing claimed effects, or alternately, it would've been obvious to one of ordinary skill in the art to employ standard SiO_2 deposition techniques, thus resulting in the presence of -OH with resultant water desorption during 193 nm laser use.

To reiterate, Ruffner recognizes the problems caused by deep UV and extreme ultraviolet (EUV) wavelengths on optical lenses or mirrors, including compaction (col. 4, lines 29-67), teaching the use of multilayered, high reflectance coatings for optical devices such as mirrors to be used with DUV or EUV (col. 5, lines 1-24; col. 8, lines 9-67+; col. 10, lines 3-35+), where the importance of determining the optimal thickness for particular parameters, such as wavelengths and angles of incidence, is discussed (col. 12, lines 2-26+; col. 14, lines 30-49; and the sequence of steps described in col. 15, lines 5-col. 17, line 18 & figure 6), with exemplary alternating layers for reflective coatings discussed in col. 13, lines 18-

Art Unit: 1792

67, especially table 1 disclosing pairs of dielectric layers for use at 193 nm including aluminum oxide with one of silicon dioxide, magnesium fluoride or calcium fluoride. In step 440 (col. 17, lines 14-17) appropriate radiation, such as 193 nm ArF laser radiation, is applied to the multilayered mirror for characterization thereof, with further teachings of use for the multilayered dielectric reflective films as taught by Ruffner suggesting use at such wavelengths, thus providing teachings of exposure of claimed subjects to claimed the UV radiation, which will inherently produce the claimed effect during the lifetime of the coated mirror, or alternately, it would've been obvious to one of ordinary skill in the art that during the use of the product of Ruffner's process maximum densification would have been expected to be achieved, where one of ordinary skill would further consider Ruffner's teachings concerning compaction in the prior art, such that its potential effects would have been expected to be considered in the overall process.

7. Claims 2 & 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruffner.

While Ruffner does not teach what the lifetime of their products will be, nor the parameters during use for energy per pulse, such as 9 mJ/pulse or 15-18 mJ/pulse, it would've been obvious to one of ordinary skill in the art to employ dielectric mirrors as taught by Ruffner for extended periods of time for economic reasons, thus it would've been expected that over the lifetime of use millions or billions of pulses as claimed & more would be applied to the mirrors. Furthermore, since the claims do not actually require the specific number of pulses & energy per pulse in the claims, due to the language of "at least the equivalent of about", it is also noted that over the lifetime of the product equivalent amount of energies as supplied from the pulses & energies per pulse, would have been expected to be applied, which would be inherently producing effects as discussed above for the dielectric oxides using 193 nm lasers.

8. Claims 1 & 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Belleville et al. (188 or 517).

Art Unit: 1792

Applicant's amendments have differentiated the claims from Belleville et al. by requiring the use of a laser to effect the compaction &/or densification of the multilayered dielectric reflectivity coating, whereas Belleville et al. when discussing the source of UV radiation of claimed wavelengths specify use of lamps, such as excimer lamps, however an excimer lamp & an excimer laser will produce like wavelengths of light given like gas compositions for producing the excimer effect, such that it would've been obvious to one of ordinary skill in the art, that depending on the optics employed equivalent irradiation of substrates may be affected by either excimer lamps or excimer lasers, especially considering that for these claims there is no limit or parameters that described how laser radiation is applied.

Applicants have also amended their claims to require that they densification or compaction process involves the removal of water vapor, and while Belleville et al. do not discuss the mechanism by which their UV rays at full power cause densification & crosslinking, as the exemplary depositions of the Ta₂O₅-SiO₂ multilayer involves precursor solutions such as Si(OEt)₄/EtOH solutions with no mention of deposition under controlled atmosphere (i.e. in air may be assumed) the resultant films ((118) column 16), which are to be UV-B or UV-C (180-280 nm) treated for densification, would have been expected to have hydrogen bonded moisture present therein from exposure to the air & as well as the films being inclusive of at least some -OH ligands formed in the polymeric oxide, thus the taught UV densification/crosslinking techniques would have been expected to be inherently inclusive of the removal from the films of these impurities, which would have been expected to be present due to the taught deposition techniques. Note that it is old and well-known to those of ordinary skill in the chemical arts that the presence of -OH in oxide materials such as silicon dioxide tends to produce hygroscopic affects in those oxides, which are removed by removal of the hydrogen impurities, thus reduction in hydrophilicity of the film. Note that since removal of any water from any source in the UV treatment process as described by Belleville et al. would affect the claimed densification, and thus read on applicants' claims as written, especially

Art Unit: 1792

considering that from applicants' specification as written, it is impossible to determine the source of the water being removed from their essentially generic dielectric films.

To reiterate, Belleville et al. (188) teach preparing optical material by the depositing on a substrate (organic such as plastic, or inorganic such as glass) at least two layers of inorganic polymeric material, such as alternating high & low index of refraction layers containing metal oxide such as Ta_2O_5 , and silicon oxide or manganese oxide, where the optical material may be used for reflective material in dielectric mirrors for reflecting wavelengths, such as between near ultraviolet to near infrared. While the layers may be individually densified/crosslinked with DUV radiation of wavelengths from 180-280 nm from a UV lamp (excimer lamp), it is also taught to densify the assembly of layers via UV exposure of those wavelengths, where the UV dose received by the layers must be sufficient to induce crosslinking, with exposure generally conducted at energies of 5-10 J/cm² for times of 10 seconds-10 minutes, with power in the region of 350 mWatts/cm². The UV densification process is noted to affect the refractive index of the layers by increasing it, and to provide various advantages such as reduction in production time for multilayered coatings, suitability for temperature sensitive substrates, and affecting the wettability of the surface after exposure to UV for densification. In Belleville et al. (188), particularly see the abstract; col. 1, lines 7- 47, noting use of such materials for dielectric mirrors used with high energy lasers; col. 7-8, especially col. 7, lines 5-13 & 38-col. 8, line 20; col. 9, lines 19-47+ particularly directed to reflective material for mono or polychromic dielectric mirrors; col. 10, especially lines 3-6 & 24-35+ for metal or metalloid oxides to be crosslinked/densified by UV; col. 12, lines 26-28 & col. 13, lines 31-45 for effective UV exposure on refractive index of silica or tantalum oxide, etc.; col. 14, lines 31-52 for procedural outline & col. 14, lines 62-col. 15, lines 42 for UV exposure parameters; col. 16, especially lines 32-62 for another procedural outline; col. 17, lines 10-36 for advantages of using UV & lines 37 plus, especially 55 to 62 for use in preparing wide spectrum than reflective material; example 14 preparation of a bi-layer optic material of high index layer of tantalum oxide & a low index layer of

Art Unit: 1792

silicon dioxide, where final crosslinking/densification of all layers by exposure to taught UV is employed; and claims, especially 1-2, 4-5, 8 & 13-31.

Belleville et al. (517) has teachings substantially similar to those of (188), however as can be seen in example 4, bridging col. 25-26, additional teachings concerning the effect of UV radiation on the refractive index & the thickness of the layer are presented, particularly stating that "the change in the refractive index n and the thickness of the layer e are both functions of the number of passes under UV" (col. 25, lines 63-65). Examples 5 & 6 on col. 26-27 are also directed to UV exposure techniques.

While both Belleville et al. references teach UV densification of materials that read on those claimed, they do not explicitly teach that further exposure to some wavelength of DUV or shorter radiation will not cause some densification, however whether or not the taught this densification is sufficient to cause maximum densification (i.e. where none more will occur), the densification that is performed inherently inhibits further densification to some degree if/when subsequent exposure to taught or claimed wavelengths occur, due to the elimination of compositional or microstructural features that are less dense or porous during the taught UV treatment. Alternately, it would've been obvious to one of ordinary skill in the art to optimize the taught exposures, so that the cross-linking reaction & densification process goes to completion, such that the optical characteristics of the produced optical product will not alter during use, especially considering the teachings within the references that the UV densification process affects the refractive index of the materials employed, and considering that in order to form this multilayered coating for affecting reflectivity characteristics, one is employing multiple layers of different refractive indexes, such that it is clearly recognized that the refractive index employed is important & controlled by the taught densification procedure, so that one of ordinary competence in the art would have been expected to perform the taught process in order to achieve full densification of the product such that its qualities & properties would not be affected by later use. In Belleville et al. (571) this concept is

Art Unit: 1792

further obvious due to the explicit teaching of both the refractive index and thickness of the layer being functions of the number of passes under UV, which can be considered equivalent to doses of UV.

As noted above, both Belleville et al. teach that the UV exposure of these coatings that affect reflectivity, also affects the wetting ability of the exposed surfaces, a property which is related to hydroscopicity, and as discussed above the amount of UV exposure would have been expected by one of ordinary skill in the art to affect the degree of cure/densification, thus it would've been obvious to one of ordinary skill in the art who desires certain properties in the resultant optical multilayer product, to determine the dosages required to optimally produce the desired product, which since it may relate to wetting ability and densification, it would have been obvious to analogously determine dosage for hydroscopicity & compaction, which are related properties.

9. Claims 1-2 are rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Pan et al. (2002/0001672 A1).

Claims 3-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pan et al.

Applicants have amended their claims to require that removal of water from the unspecified multilayered dielectric reflectivity coating induces compaction or densification of the coating, and while Pan et al. teach coatings as claimed which are treated with lasers as claimed, they do not discuss removal of water vapor from those coating during the laser irradiation. It is noted however, that in discussing PVD deposition techniques for the initial aluminum metal & magnesium fluoride (dielectric) deposits in [0025], at the end of this paragraph it notes that due to the pressure is employed, the background gases such as oxygen or hydrogen have a substantially lesser arrival rate than the molecules or atoms being vapor deposited, such that "very little oxygen or hydrogen present within the bulk coating materials", but they do not teach that there is no oxygen or hydrogen present in such deposits, thus suggesting that such contaminants from background gases are not totally eliminated. Furthermore, the other taught coatings that may be employed in multilayers over the aluminum surface including alumina and silicon dioxide

Art Unit: 1792

([0031], [0035], [0046-47] & [0049+]), where the oxide coatings are clearly deposited via equivalent PVD techniques ([0046]), thus would have also been expected to have low but present hydrogen contamination (i.e. -OH) in the oxide microstructures, which would have been expected to have been removed in subsequent irradiation in the course of the use of the products, especially as exposure is disclosed to be in air ([0036] & [0049]). Therefore, this addition to the claim limitations, while differing from the discussion in Pan et al., is not considered to differentiate over the prior art due to inherent effects of the radiation on the taught dielectric oxide layers in the course of their use. Also, treating undifferentiated materials via like lasers at like wavelengths applied at equivalent energies must be considered to affect inherently the same results, especially considering the impossibility as presently disclosed of determining what materials applicants are actually treating, hence where the water being removed is coming from & if applicants' disclosure is treating the same or different materials from those disclosed in the cited prior art.

Pan et al. teach making diffraction gratings for lasers producing wavelengths of 248 or 193 nm, i.e. KrF or ArF excimer lasers, where preferred embodiments include depositing over a pure dense coat of aluminum, two or four layer structures that protect the aluminum and improve the normal reflectivity of the desired wavelengths, where combinations of those layers include $\text{MgF}_2 + \text{SiO}_2$, or $\text{MgF}_2 + \text{Al}_2\text{O}_3$, which are dielectric. It has taught that the multilayered structures are necessary to protect the grating from degradation beyond use with 2 billion pulses, where exemplary test pulses include 10 mJ per pulse. See the abstract; figures 8, 9B, 9C, & 12; [0002]; [0006-8]; [0027- 48], especially [0027-29] for tests or use up to and beyond 2 billion pulses [0031, 35, 37-40 & 46-47], for particular multilayers & their use in further increasing the reflectivity; noting [0043] teaches it is especially important to use the multilayer coating with high power UV lasers & [0045] noting that other techniques of applying the taught dielectric layers may be employed. Thus, Pan et al.'s teachings of using the multilayered structures beyond 2 billion pulses is considered inclusive of such exposure, and that it would read on the requirement of "at

Art Unit: 1792

least the equivalent of about 2 billion pulses at 9 milliJoules per pulse" in the scope that it might possibly be interpreted in light of applicants' specification & considering that only equivalence is required. It is further noted that the silicon oxide or aluminum oxide materials, treated by such a radiation are effectively/inherently been annealed, such that any defects or process the in the deposited oxide layers would inherently be compacted or densified, such that during use maximum densification would have been expected to be achieved. Alternately, while paragraph [0029] suggests that the multilayer protective structures are required to protect grating surfaces from degradation beyond about 2 billion pulses, they do not explicitly state that such number of pulses are necessarily applied to their taught two and four protective dielectric layer structures for improving reflectivity, however given this teaching it would've been obvious to one of ordinary skill in the art to use them with that number of pulses and more, thus reading on the claims has written.

While the particular pulse repetition rate or the 15-18 mJ per pulse... parameter limitations of claims 3 and 4 are not present in Pan et al., the generic teaching for use of these grating structures for high-energy excimer lasers, would've been expected to be employed for a variety of energies depending on particular use, such that energy such as those claimed, which are within an order of magnitude of exemplary test pulses' energies, would have been expected by one of ordinary skill in the art to be useful therewith, and the rate at which the laser pulses are delivered would have been expected to be inclusive of the range of pulse repetition rates available to excimer lasers, which would have been expected to be inclusive of the claimed rate, which as presently claimed has no significance with respect to effect, as it is applied to delivery of energy of equivalent amounts to insufficiently defined materials.

10. Other previously cited art of interest to the state-of-the-art included: Callies et al. (2004/0190111 A1), teaching further use of optical components with multilayer coating is that affect reflective & transmissive properties (abstract; figures 8-9; [0057], [0078], [0082- 85, especially 85]); and Callegari et al. (2006/0040513 A1), which is not prior art, but has teachings of interest concerning DUV

Art Unit: 1792

laser annealing SiCOH dielectric films to improve their properties, and which is now matured into PN 7,223,670 B2.

Further of interest is the German patent to Kaiser et al. (DE 19540414 C1), whose English abstract discusses reflectors with a film system, which have very low water absorption & are exposed to UV radiation

11. Applicant's arguments filed 8/8/2007 & discussed above have been fully considered but they are not persuasive.

Applicants' claims do not limit **when in the lifetime** of the multilayered dielectric reflectivity coating that is on a substrate that the claimed **stabilization of spectral shift occurs**, thus it may be during manufacture before the coated substrate is made part of some other device, **or** the process **as claimed** is inclusive of such stabilization occurring after the coated substrate has already been in use for some time, which although this may not be advantageous (since it may not stabilize with desired properties) or applicant's intent, it is encompassed by what applicants **have claimed**, thus applicants' arguments are not convincing. If applicants' claims clearly specified that the spectral shift stabilization was performed during manufacture & before being employed for any intended and use, so as to inhibit subsequent compaction or densification during use for its intended purpose (i.e. before any such use occurred), that would clearly differentiate from Ruffner et al. or Pan et al., as discussed above. Note, applicants should take care to clearly cite support on the record for any such amendment.

Note that whether or not a reference recognizes the occurrence of a mechanism or process that would inherently exist in taught conditions, such as removal of water vapor, is not relevant to whether or not that reference reads on a claimed effect, as long as it would have been expected to be occurring anyhow. It is impossible from applicants' specification as presently presented to determine what conditions create the possibility of removing water vapor, as it is impossible to determine what materials that might be capable of having water vapor removed are employed, since all materials being treated are

Art Unit: 1792

only identified by acronyms, tradenames, or the like, that provide no meaningful compositional information to the examiner, making a meaningful evaluation of the process & the scope encompassed by such disclosure impossible to determine with the information at hand.

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marianne L. Padgett whose telephone number is (571) 272-1425. The examiner can normally be reached on M-F from about 8:30 a.m. to 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks, can be reached at (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

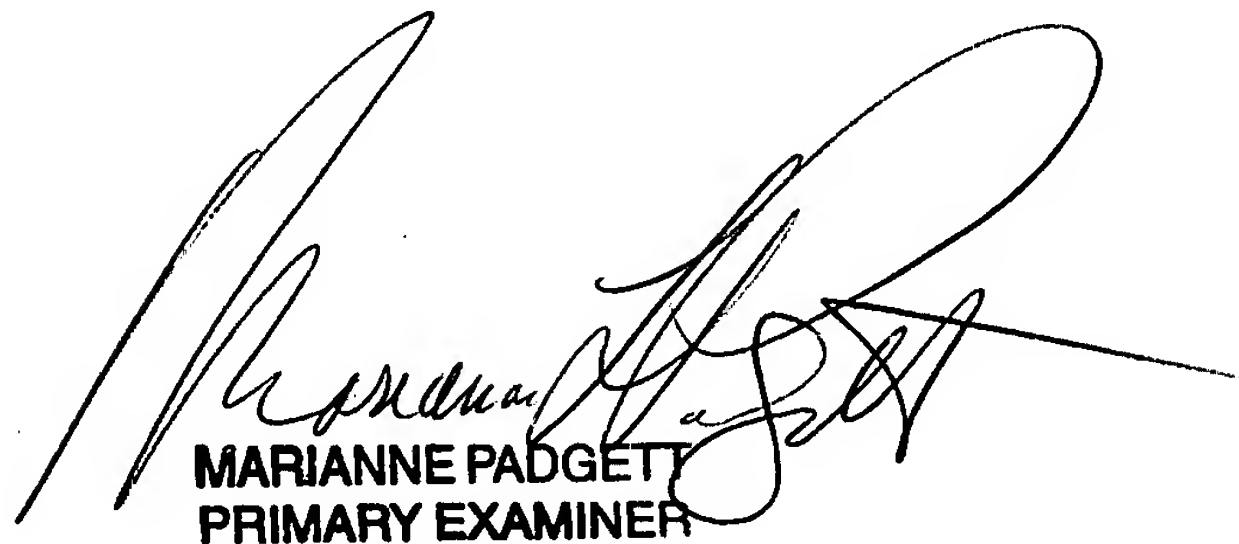
Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair->

Art Unit: 1792

direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MLP/dictation software

10/22-23/2007



MARIANNE PADGETT
PRIMARY EXAMINER